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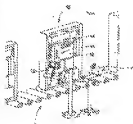
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(54) GAME MACHINE INSPECTION DEVICE

(57)Abstract

PROBLEM TO BE SOLVED: To provide a device capable of wirely checking the seated state of a seat pin in the main board case of a ball shooting game machine and requiring no manual operation for the check.

SOLUTION: A first camera 10 photographs a prescribed seat pin in a first seat part 44, and a second camera 12 photographs a prescribed seat pin in a second seat part 46. Whether the seat pin is in the seated state or not is judged by judging whether the seat pin is protruded or not. In this judgment, a prescribed color is spotted to the seat pin to perform the judgment on the basis of the size of the area where this color is detected. Otherwise, the shape may be extracted from the taken image to perform the judgment on the basis of the shape.



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CLAIMS

[Claim 1]

[Claim 1] Game machine test equipment which inspects a game machine which has the board case in which a control board which controls a game action was stored, comprising:
An imaging means which pictures a sealing means provided in the board case.
A closure judging means which analyzes a picture pictured by this imaging means and judges whether the above-mentioned sealing means is a sealed condition.

[Claim 2] The game machine test equipment according to claim 1 which has a sealing pin in which the above-mentioned sealing means serves as protrusion state at the time of opening, and serves as a letter of crush at the time of closure and with which the above-mentioned closure judging means is characterized by judging projection or crush of this sealing pin.

[Claim 3] In order that the above-mentioned closure judgment part may picture the above-mentioned sealing means correctly further, When it has an image pickup position judging means which judges whether a position for [of the above-mentioned imaging means] an image pick-up is the right and a position for an image pick-up is judged by this image pickup position judging means to be the right. The game machine test equipment according to claim 1 or 2 characterized by judging whether a sealing means is a sealed condition by this closure judging means.

[Claim 4] The game machine test equipment according to claim 1, 2, or 3, wherein the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means judge according to area which a sealing pin in a picture is pictured by the above-mentioned imaging means occupies.

[Claim 5] The game machine test equipment according to claim 4 comprising area which a sealing pin occupies when the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means compare predetermined color in a picture

produced by the above-mentioned imaging means.

[Claim 8] The game machine test equipment according to claim 1, 2, or 3, wherein the above-mentioned closure judging means and/or the above-mentioned image pickup portion judging means detect shape in a picture produced by the above-mentioned imaging means and judge according to this detected shape.

[Translation done]

mentioned position, and in the 1st. An imaging means which pictures a sealing means which is game machine test equipment which inspects a game machine which has the sealed case in which a control board which controls a game action was stored, and was provided in this based case. It has a closure judging means which analyzes a picture pictured by this imaging means and judges whether the above-mentioned sealing means is a sealed condition.

[0007]Therefore, since it can be confirmed automatically whether a sealing means is a sealed condition, there is no leakage of a check and a check can be ensured. It becomes possible for an inspector not to take a help.

[0008]In the 1st composition of the above, in the 2nd, it has a sealing pin in which the above-mentioned sealing means serves as protrusion state of the time of sealing, and serves as a letter of finish of the time of closure, and the above-mentioned closure judging means judges projection or finish of the sealing pin to it.

[0009]In order that the above-mentioned closure judgment part may picture the above-mentioned sealing means correctly further in the 1st or 2nd composition of the above in the 3rd, when it has an image pickup position judging means which judges whether a position for [of the above-mentioned imaging means] an image pick-up is the right and a position for an image pick-up is judged by this image pickup position judging means to be the right, it is judged by the closure judging means whether a sealing means is a sealed condition.

Therefore, since it judges a point whether a position for [of an imaging means] an image pick-up is the right, it becomes [whether a sealing means is a sealed condition and] possible to inspect correctly.

[0010]To the 4th, the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means judge in one from the above 1st to the 3rd of composition according to area which a sealing pin in a picture pictured by the above-mentioned imaging means occupies.

[0011]To the 5th, in the 4th composition of the above, when the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means compute predetermined color in a picture pictured by the above-mentioned imaging means, area which a sealing pin occupies is computed.

[0012]In one from the above 1st to the 3rd of composition, in the 6th, the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means detect shape in a picture pictured by the above-mentioned imaging means, and it judges to it according to this detected shape.

[0013]

[Embodiment of the invention]The example as an embodiment of the invention is described using a drawing. The pinball machine test equipment P of the 1st example based on this invention is provided with the following.

in a sealing pin is needed.

[0110] These sealing pins 50-56, 60-66 are colored a color which is different in the surface part 43 of the main board case 42. For example, supposing the sealing pins 50-56, 60-56 are colored yellow, the surface part 43 of the main board case 42 is colored blue including the above-mentioned peripheral part 75.

[0120] In charge of manufacture of a pinball machine, respect whether one sealing pin in the 1st sealed part 44 is closed, one sealing pin in the 2nd sealed part 45 is closed, and these sealing pins are closed by this pinball machine test equipment P, but, in this example, the sealing pin 56 and the sealing pin 66 shall be closed.

[0121] Therefore, the 1st camera 10 of the above is set so that the position of the sealing pin 50 in the main board case 42 may be pictured, and the 2nd camera 12 is set so that the position of the sealing pin 60 in the main board case 42 may be pictured. That is, if a predetermined inspection position is made to suspend the pinball machine 40 by controlling the 1st conveyor 5, exactly, the 1st camera 10 pictures the position of the sealing pin 50, and the 2nd camera 12 can picture the position of the sealing pin 60. Direction of the 1st camera 10 is set so that the position of the sealing pin 50 may be pictured from across, as shown in drawing 2, and as shown in drawing 1 and drawing 3, direction of the 2nd camera 12 is set so that the position of the sealing pin 60 may be pictured from across. This is for judging whether the sealing pin has become "X" like. These 1st cameras 10 and the 2nd camera 12 are controlled by the CCD camera.

[0122] The 1st camera 10 and the 2nd camera 12 send the pictured picture information to the control section 14.

[0123] Next, the above-mentioned control section 14 is explained. This control section 14 is provided with the following.

An shown in drawing 5, it is the image capturing part 15.

Closure judgment part (closure judging means) 18.

Error signal outputting part 20.

The output control part 22 and the outputting part 24.

[0124] Here, the image capturing part 15 functions as an interface for incorporating the picture information pictured with the 1st camera 10, and the picture information pictured with the 2nd camera 12.

[0125] This closure judgment part 18 is provided with the following.

Color extracting part 18a.

Image decision part 18b.

Here, in the picture information incorporated by the image capturing part 15, the color determination part 18a extracts the pixel of a predetermined color. The extraction of this

predetermined color can consider how to extract only that color using a colored filter. For example, when processing which subtracts the absolute value of hue difference with a predetermined color (for example, yellow) from chroma saturation about each pixel is performed and the result is over the threshold for the color determination which is each pixel, it judges with it being a color predetermined [this].

[0026]This image decision part 18b judges whether the rate that the extracted (predetermined) color occupies was computed and it is over the predetermined threshold. This threshold differs from the threshold for the color determination of each above-mentioned pixel.

[0027]The error signal outputting part 20 has a function which outputs an error signal, when judged with it being over a threshold by the described image judgment part 18b, an error signal is outputted, and conversely, when judged with it not being over a threshold, it does not output an error signal. An error signal will be outputted when judged with it being over at least one threshold among the setting pins of the couple picturized. This error signal is outputted to the conveyor control section 30.

[0028]The output to the outputting part 24 is controlled, the outputting part 24 is controlled by this output control part 22, and the above-mentioned output control part 22 outputs predetermined information to the indicator 25.

[0029]The first controlling element 26 performs operation of the pinball machine test equipment P.

[0030]Next, operation of the above-mentioned pinball machine test equipment P is explained. First, detection of that the pinball machine 40 to be examined had the 1st conveyor 5 stop conveyed, and the pinball machine 40 arrived at the predetermined inspection position on the 1st conveyor 5 will stop conveyance of the 1st conveyor 5. Thereby, the pinball machine 40 stops in a predetermined inspection position. In the main board case 42 of the pinball machine 40 conveyed, the seating pin of a couple, i.e., the seating pin 50 and the seating pin 60, shall be pushed in essentially.

[0031]Then, the 1st camera 10 and the 2nd camera 12 picture a photographic subject. That is, the 1st camera 10 pictures the seating pin 60, and, on the other hand, the 2nd camera 12 pictures the seating pin 50. The obtained picture information is incorporated into the output section 14 by the image capturing part 16 of the control section 14 by picturizing. That is, each of the picture information picturized with the 1st camera 10 and the picture information picturized with the 2nd camera 12 is incorporated. The incorporated picture information is sent to the closure judgment part 18.

[0032]In the closure judgment part 18, the color extracting part 18a extracts the pixel of a specific color (color) in picture information that. For example, when the color of the seating pin is colored yellow, a yellow pixel is extracted in picture information.

[0033]And the image decision part 18b judges whether the color of the seating pin, i.e., the

Thereby, the pinball machine 60 is not conveyed by the downstream but is again returned to the work of a previous process. That is, it is returned to the process of doing the work, which closes a sealing pin.

[0040]Since it can be inspected automatically whether the predetermined sealing pin is closed, it becomes unnecessary as mentioned above, to be able to prevent the mistake of an inspection of the sealed condition of a sealing pin, and to inspect the sealed condition of a sealing pin according to artificial work in the pinball machine test equipment P of the example.

[0041]Next, the pinball machine test equipment in the 2nd example is explained. Although the pinball machine test equipment of the 2nd example is the composition of the approximately same appearance as the pinball machine test equipment of the 1st example of the above, the composition of the closure judgment part 18 differs. That is, when the 1st example of the above extracts a predetermined color from picture information, the sealed condition is judged, but in being this example, it judges a sealed condition by extracting shape.

[0042]That is, the shape extraction part 18c and the image decision part 18d are formed in the closure judgment part 18 of the control section 14 in the pinball machine test equipment of this example. In the picture information incorporated by the image capturing part 18, the shape extraction part 18c extracts shape. That is, the shape extraction part 18c extracts shape (outline) by processing edge detection etc. about the incorporated picture information.

[0043]And in the image decision part 18d, it is judged whether the data of shape in case the sealing pin is closed correctly is held beforehand, and the sealing pin is closed from the degree whose data of the shape corresponds or compared with the data of the extracted shape. That is, about the sealing pin 50, it is judged whether the sealing pin is closed by storing the data of shape in case this sealing pin 50 is closed correctly, and comparing the data of the shape with the data of the extracted shape. It is judged whether the sealing pin is closed by storing the data of shape in case this sealing pin 50 is closed correctly and about the sealing pin 50, and comparing the data of the shape with the data of the extracted shape.

[0044]For example, if the shape is extracted when the sealing pin 50 is closed, if the sealing pin 50 is taken for an example, when it comes to be shown in drawing 9 (a) and the sealing pin 50 is not closed, if the shape is extracted, it will become like drawing 9 (b). Therefore, it becomes possible by storing beforehand the data of shape as shown in drawing 9 (a), and comparing with this to judge whether the sealing pin is closed. The same may be said of the case of the sealing pin 60.

[0045]It may be made to judge whether the sealing pin is closed by storing the data of shape in case the sealing pin is closed correctly, and the data of shape in case the sealing pin is not closed, and judging which the data of the extracted shape resembles.

[0046]Although explained as what judges whether the sealing pin is closed in explanation of the 1st above-mentioned example and the 2nd example based on the picture information

incorporated with the 1st camera 10 and the 2nd camera 12. After judging whether the sealing pin which is going to judge beforehand is picturized correctly, it may be made to judge whether the sealing pin is closed.

[0047] That is, although the composition of the control section 14 in that case is the same as that of the case of the 1st example of the above, and the 2nd example, and abbreviation, as shown in drawing 10, it differs in that the image pickup position judgment part (image pickup position judging means) 17 is formed in the preceding paragraph of the closure judgment part 16.

[0048] That is, this image pickup position judgment part 17 judges whether the sealing pin is photoed correctly based on the picture information incorporated by the image capturing part 16. For example, shape is extracted from picture information and it judges whether the shape of the outline of the maximum outline of a peripheral part is detected, and. For example, since picture information as shown in drawing 11 (a) will be incorporated when the position of the sealing pin is picturized correctly if the sealing pin 50 is taken for an example, the shape shown in drawing 11 (b) should be detected at least. On the other hand, when the position of a sealing pin shifts and is picturized, the shape which comes to be shown in drawing 12 (a) and shown in drawing 11 (b) as a picture captured, for example is not detected. Therefore, what is necessary is whether the shape in which shape as shown in drawing 11 (b) was contained is detected, and just to judge. On the other hand, the sealing pin 50 is judged whether shape as shown in drawing 12 (b) is detected, and.

[0049] The field of the predetermined color in picture information may be detected, and it may be judged from the area and the outline of a field of the color whether the sealing pin is photoed correctly. That is, if the sealing pin 50 is taken for an example, an image pickup position shifts, and when picture information as shown in drawing 12 (a) is incorporated, the field of the color of a sealing pin will become small. Then, a threshold still smaller than the case where a sealing pin is a second condition is set up, and when the area of the color extracted rather than the threshold is small, the image pickup position has shifted and it judges whether the sealing pin is being picturized correctly. In a picture when the picture of the sealing pin is picturized correctly, as shown in the field R1 by which hatching was carried out in drawing 11 (a) or a picture of the field of a sealing pin. Or when the image as shown in the field R2 in which hatching of drawing 7 (a) was carried out should be captured, when the image of the field of the color of a sealing pin corresponds to the color, it judges with the image pickup position of a sealing pin having shifted. For example, the image pickup position has shifted, and when picture information as shown in drawing 12 (a) is incorporated, the field of the color of a sealing pin serves as shape as shown in the hatching field R3 of drawing 13, and differs from drawing 11 (a) and drawing 7 (a).

[0050] And when judged with the sealing pin being picturized correctly, it is judged by the

closure judgment part 10 whether the sealing pin is closed. Since it is the same as that of the 1st example of the above, and the 2nd example, subsequent processes are omitted. On the other hand, when the sealing pin is not pinched correctly, direction of the 1st camera 11 and the 2nd camera 12 is reset, or, in the case of a lateral transition, the 1st over-exposure is reset manually, and a gap is corrected.

[0051] Thus, by detecting a gap of an image pickup position a priori, the judgment which was (about the sealed condition of a sealing pin) mistaken can be prevented, and it becomes possible to perform the exact judgment about a sealed condition. That is, when a judge with the pixel number of the predetermined color in the captured picture like (in the case of the 1st example of the above) especially, in spite of not closing the sealing pin, there is a possibility that it may be judged with (being a sealed condition accidentally noting that there are few pixel numbers of a color predetermined (this) than a threshold, when the image pickup position has shifted, but, by judging whether the image pickup position has shifted a priori, it becomes possible to prevent such fear.

[0052] Although the above-mentioned example explained as what shut close the sealing pin 60 and close the sealing pin 60 in the 2nd sealed part 46 in the 1st sealed part 44 as a sealing pin closed, even if it is a case where it is not restricted to this, but close other sealing pins in the 1st sealed part 44, and other sealing pins in the 2nd sealed part 46 are closed, the above-mentioned contents are the same. Only the portion (sealing pin) closed at the time of shipment may be colored a color different from other portions.

[0053] Although the example explained taking the case of the sealed machine, i.e., a push-type machine, as a game machine to be examined, if it is a game machine which has a case member which is not restricted to this as a game machine and has a sealing pin, the application to other game machines, for examples, a ball arranging machine, a mahjong table game machine, a rotary drum type game machine, etc. is possible.

[0054]

[Effect of the invention] Since it can be confirmed automatically whether a sealing means is a sealed condition according to the game machine test equipment based on the invention, there is no leakage of a check and a check can be ensured. It becomes possible for an inspection not to use a help.

[1644] Since it confirms whether the position for (of an imaging means) an image pickup is right in having an image pickup position judging means, it becomes (whether a sealing means is a sealed condition and) possible to inspect correctly.

[Translation done]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a top view showing the composition of pinball machine test equipment based on the example of this invention.

[Drawing 2] It is a perspective view showing the composition of the important section of pinball machine test equipment based on the example of this invention.

[Drawing 3] It is a block diagram showing the composition of the important section of pinball machine test equipment based on the example of the invention.

[Drawing 4] It is a perspective view showing the composition of the main board case attached to a pinball machine.

[Drawing 5] It is an important section perspective view showing the important section of a main board case.

[Drawing 6] It is an explanatory view for explaining operation of pinball machine test equipment.

[Drawing 7] It is an explanatory view for explaining operation of pinball machine test equipment.

[Drawing 8] It is a block diagram showing the composition of the important section of pinball machine test equipment based on other examples of this invention.

[Drawing 9] It is an explanatory view for explaining operation of pinball machine test equipment.

[Drawing 10] It is a block diagram showing the composition of the important section of pinball machine test equipment based on other examples of this invention.

[Drawing 11] It is an explanatory view for explaining operation of pinball machine test equipment.

[Drawing 12] It is an explanatory view for explaining operation of pinball machine test equipment.

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MEANS

[Means for Solving the Problem]Are created in order that this invention may solve the above-mentioned problem, and in the 1st. An imaging means which pictures a sealing means which is game machine test equipment which inspects a game machine which has the board case in which a control board which controls a game action was stored, and was provided in this board case. It has a closure judging means which analyzes a picture picturized by this imaging means and judges whether the above-mentioned sealing means is a sealed condition (GOOD)Therefore, since it can be confirmed automatically whether a sealing means is a sealed condition, there is no leakage of a check and a check can be ensured. It becomes possible for an inspection not to turn a help.

[0003]In the 1st composition of the above, in the 2nd, it has a sealing pin in which the above-mentioned imaging means serves as protrusion state at the time of opening, and serves as a letter of insert at the time of closure, and the above-mentioned closure judging means judges projection or insert of the sealing pin to it.

[0004]In order that the above-mentioned closure judgment part may picture the above-mentioned sealing means correctly further in the 1st or 2nd composition of the above to the 3rd, When it has an image pickup position judging means which judges whether a position [of the above-mentioned imaging means] an image pick up is the right and a position for an image pick-up is judged by this image pickup position judging means to be the right, it is judged by this closure judging means whether a sealing means is a sealed condition. Therefore, since it judges a priori whether a position for [of an imaging means] or image pick up is the right, it becomes [whether a sealing means is a sealed condition and] possible to inspect correctly.

[0005]To the 4th, the above-mentioned closure judging means and the above-mentioned image pickup position judging means judge in one from the above 1st to the 3rd of composition according to area which a sealing pin in a picture picturized by the above-mentioned imaging

means occupies

[0011]In the 1st to the 4th composition of the above, when the above-mentioned picture judging means and/or the above-mentioned image pickup position judging means recognize predetermined color in a picture obtained by the above-mentioned imaging means, and a which a sealing pin occupies is recognized.

[0012]In one from the above 1st to the 3rd of composition, in the 1st, the above-mentioned closure judging means and/or the above-mentioned image pickup position judging means detect shape in a picture obtained by the above-mentioned imaging means, and it judges so it according to the detected shape.

[0013]

[Embodiment of the invention]The example as an embodiment of the invention is described using a drawing. The pinball machine test equipment P of the 1st example based on the invention is provided with the following.

As shown in drawing 1, drawing 2, and drawing 3, it is the 1st camera 10.

The 2nd camera 12.

Control section 14.

The first controlling element 26, the indicator 28, and the conveyor control section 30.

[0014]Thus, 1st camera 10 and 2nd camera 12 are installed near the transportation line 3, and are set up picture the predetermined part of the main board case 42 attached to the rear face of the pinball machine 40. The 1st camera 10 of the above and the 2nd camera 12 function as the above-mentioned imaging means.

[0015]Here, if those transportation lines 3 are explained, these transportation lines 3 have the 1st conveyor 5 and the 2nd conveyor 7, as shown in drawing 1 and drawing 2, and the 2nd conveyor 7 is formed in the downstream of the 1st conveyor 5. The air cylinder 8 is formed in the 2nd conveyor 7, and the 2nd conveyor 7 is movable in the transportation direction of the pinball machine 40, and a right-angled direction. That is, the pinball machine with which the inspection of the sealed condition of the sealing pin of the main board case 42 was conducted, and the error was detected by the inspection on the 1st conveyor 5, by moving this 2nd conveyor 7 in the direction with a right-angled transportation direction, it will be removed from original transporting line and sealing operations will be given again.

[0016]The 1st conveyor 5 and the 2nd conveyor 7 are roller conveyors, and their operation is controlled by the conveyor control section 30.

[0017]Next, if the main board case 42 attached to the pinball machine 40 is explained, this main board case 42 is formed in general with resin, and two or more sealing pins are formed in the surface part 43 of this main board case 42. That is, as shown in drawing 4, the 1st sealed part 44 is formed in the longitudinal direction of the main board case 42, and as shown in

drawing 5 (a), the four sealing pins 50, i.e., a sealing pin, the sealing pin 52, the sealing pin 54 and the sealing pin 56 are formed in the 1st sealed part 44 at it. The 2nd sealed part 46 is formed in the direction of the shorter side of this main board case 42 and as shown in drawing 5, as shown in drawing 5 (b), the four sealing pins 60, i.e., a sealing pin, the sealing pin 62, the sealing pin 64, and the sealing pin 66 are formed at it at this 2nd sealed part 46. Each of these sealing pins 50-56, 60-66 are approximately cylindrical pin parts projected from the main board case 42, and the peripheral part 70 of approximately ring form projects them on the periphery of these sealing pins 50-56, 60-66 in the surface part 43, and they are provided in it. This peripheral part 70 is united with the surface part 43 of the main board case 42.

[0018]By these sealing pins 50-56, 60-66 being for forbidding the open operation of the main board case 42, and pushing in one sealing pin in the 1st sealed part 44 and one sealing pin in the 2nd sealed part 46, in order for the open operation of the main board case 42 to become impossible and to open the main board case 42, operation of cutting the predetermined region in a sealing pin is needed.

[0019]These sealing pins 50-56, 60-66 are colored a color which is different in the surface part 43 of the main board case 42. For example, supposing the sealing pins 50-56, 60-66 are colored yellow, the surface part 43 of the main board case 42 is colored blue including the above-mentioned peripheral part 70.

[0020]In charge of manufacture of a pinball machine, inspect whether one sealing pin in the 1st sealed part 44 is closed, one sealing pin in the 2nd sealed part 46 is closed, and those sealing pins are closed by this pinball machine test equipment P, but, in the example, the sealing pin 56 and the sealing pin 66 shall be closed.

[0021]Therefore, the 1st camera 10 of the above is set so that the position of the sealing pin 50 in the main board case 42 may be pictured, and the 2nd camera 12 is set so that the position of the sealing pin 60 in the main board case 42 may be pictured. That is, if a predetermined inspection position is made to suspend the pinball machine 40 by controlling the 1st conveyor 5, exactly, the 1st camera 10 pictures the position of the sealing pin 50, and the 2nd camera 12 can picture the position of the sealing pin 60. Direction of the 1st camera 10 is set so that the position of the sealing pin 50 may be pictured from across, as shown in drawing 2, and as shown in drawing 1 and drawing 2, direction of the 2nd camera 12 is set so that the position of the sealing pin 60 may be pictured from across. This is for judging whether the sealing pin has become "open". These 1st camera 10 and the 2nd camera 12 are constituted by the CCD camera.

[0022]The 1st camera 10 and the 2nd camera 12 send the pictured picture information to the control section 14.

[0023]Next, the above-monitored control section 14 is explained. These control section 14 see the image capturing part 16 and a closure judgment part, as shown in drawing 3.

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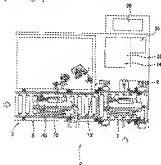
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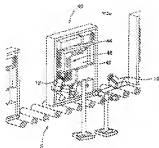
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DRAWINGS

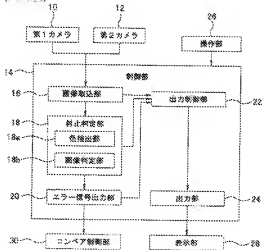
Drawing 11



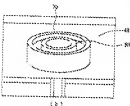
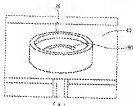
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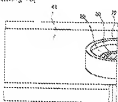
[Drawing 3]



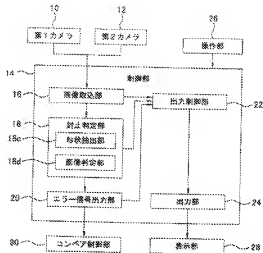
[Drawing 4]



[Drawing 10]



[Drawing 7]



[Drawing 10]